

## ABSTRACT

Conventional purification apparatuses and operation methods therefor require continuous addition of coagulants as expendables in every operation, and the coagulants are expensive, thereby causing increase in operation cost, and furthermore, the operators have to convey and resupply the coagulant at regular intervals which further increases the operation cost owing to the personnel cost to be increased accordingly. The invention provides a purification apparatus and an operation method therefor, for coagulating and separating particularly the pollutant matter in sea water including oil and the like, which can regenerate and reuse the coagulant within the apparatus, without scarcely resupplying the coagulant and acid/alkali solutions. For disintegrating coagulated flocs and regenerating the coagulant from the sludge, a strong alkali solution and a strong acid solution are required. According to the invention, an alkali water enriched in sodium hydroxide and an acidic aqueous solution containing hydrochloric acid and the like are generated by electrolyzing sea water and collecting sodium ion and chloride ion respectively in the cathode and anode sections, and also by including hydroxide ion and hydrogen ion in sea water; the flocs in the sludge are disintegrated by use of the alkali water; pollutant matter is removed from the aqueous solution subjected to disintegration; and the strongly

acidic solution containing hydrochloric acid is added to the acidic solution from which pollutant matter has been separated and removed, and a ferric chloride aqueous solution is generated. The ferric chloride aqueous solution is the coagulant, and thereby the coagulant can be regenerated from the recovered sludge.